

MWRR for benchmarks

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Agenda

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MWRR for benchmarks

Calculation of the IRR for a portfolio

(1/2)

$$0 = \frac{EMV_P}{(1 + IRR_P)^{Y_T}} + \left(\sum_{t=1}^{T-1} \frac{-C_{P,t}}{(1 + IRR_P)^{Y_{t-0}}} \right) - BMV_P$$

- To calculate the MWR, in the industry different methodologies are used where all but one are approximation methods for the “true” MWR. In the following the internal rate of return methodology (IRR) as the "true" MWR is used because it is not only the most precise method for calculating a MWR but the one methodology that solves the full calculation problem. **The IRR is the return / interest rate that causes the ending market value and intermediate cash flows to be discounted to the beginning market value.**

Calculation of the IRR for a portfolio

(2/2)

BMV_P = Portfolio beginning market value.

EMV_P = Portfolio ending market value at T .

IRR_P = IRR of portfolio.

$C_{P,t}$ = Portfolio cash flow at t .

Y_T = Length of measurement period (to be measured in years – 365).

Y_{t-0} = Length of time period between the beginning of the measurement period and the date of the cash flow (to be measured in years – 365).

Calculation of the IRR for a benchmark

(1/2)

$$0 = \frac{EMV_B}{(1 + IRR_B)^{Y_T}} + \left(\sum_{t=1}^{T-1} \frac{-C_{B,t}}{(1 + IRR_B)^{Y_{t-0}}} \right) - BMV_B$$

where: $C_{B,t} = C_{P,t}$

BMV_B = Benchmark beginning market value.
EMV_B = Benchmark ending market value at T.
IRR_B = IRR of benchmark.
C_{B,t} = Benchmark cash flow at t.

- Here it is important that the cash inflows (outflows) are invested (de-invested) according to the actual benchmark asset allocation at the time of the cash flow and that the returns of the money invested equal the respective returns of the underlying benchmark investments. In addition cash flows have to be simulated for rebalancing activities.

Calculation of the IRR for a benchmark

(2/2)

- To calculate the IRR for a benchmark, the following data and information is needed:
 1. Time and amount of all external cash flows in and out of the portfolio against which the benchmark is analyzed. It needs to be clear whether the cash flows occur at the beginning or at the end of the day.
 2. Benchmark returns for all relevant sub-periods. Technically at minimum sub-periods should be separated by the dates of the external cash flows. The length of the sub-periods do not have to be always the same.

IRR for a customized benchmark – Example

(1/2)

Example:

Date	Portfolio cashflow	Portfolio TWRR	Portfolio cumulative TWRR	Portfolio market values before cash flow	Portfolio market values after cash flow	Portfolio cash flow stream for IRR	Portfolio profit and loss	Portfolio cumulative profit and loss
31.12.2010	20'000.00				20'000.00	-20'000.00		
31.01.2011	-	0.6000%	0.60%	20'120.00	20'120.00	-	120.00	120.00
28.02.2011	-	0.6000%	1.20%	20'240.72	20'240.72	-	120.72	240.72
31.03.2011	10'000.00	0.6000%	1.81%	20'362.16	30'362.16	-10'000.00	121.44	362.16
30.04.2011	-	0.6000%	2.42%	30'544.34	30'544.34	-	182.17	544.34
31.05.2011	-	0.6000%	3.04%	30'727.60	30'727.60	-	183.27	727.60
30.06.2011	-15'000.00	0.6000%	3.65%	30'911.97	15'911.97	15'000.00	184.37	911.97
31.07.2011	-	0.1000%	3.76%	15'927.88	15'927.88	-	15.91	927.88
31.08.2011	-	0.1000%	3.86%	15'943.81	15'943.81	-	15.93	943.81
30.09.2011	-	0.1000%	3.97%	15'959.75	15'959.75	-	15.94	959.75
31.10.2011	-	0.1000%	4.07%	15'975.71	15'975.71	-	15.96	975.71
30.11.2011	-	0.1000%	4.17%	15'991.69	15'991.69	-	15.98	991.69
31.12.2011	-	0.1000%	4.28%	16'007.68	16'007.68	16'007.68	15.99	1'007.68

Portfolio returns	
Portfolio Xirr	5.03%
Portfolio cum TWRR	4.28%
Portfolio Timing effect	0.76%

IRR for a customized benchmark – Example

(2/2)

Example:

Date	Benchmark cashflow	Benchmark TWRR	Benchmark cumulative TWRR	Benchmark market values before cash flow	Benchmark market value after cash flow	Benchmark cash flow stream for IRR	Benchmark profit and loss	Benchmark cumulative profit and loss
31.12.2010	20'000.00			-	20'000.00	-20'000.00		
31.01.2011	-	0.10%	0.10%	20'020.00	20'020.00	-	20.00	20.00
28.02.2011	-	0.10%	0.20%	20'040.02	20'040.02	-	20.02	40.02
31.03.2011	10'000.00	0.10%	0.30%	20'060.06	30'060.06	-10'000.00	20.04	60.06
30.04.2011	-	0.10%	0.40%	30'090.12	30'090.12	-	30.06	90.12
31.05.2011	-	0.10%	0.50%	30'120.21	30'120.21	-	30.09	120.21
30.06.2011	-15'000.00	0.10%	0.60%	30'150.33	15'150.33	15'000.00	30.12	150.33
31.07.2011	-	0.50%	1.10%	15'226.08	15'226.08	-	75.75	226.08
31.08.2011	-	0.50%				-	76.13	302.21
30.09.2011	-	0.50%				-	76.51	378.72
31.10.2011	-	0.50%				-	76.89	455.62
30.11.2011	-	0.50%				-	77.28	532.90
31.12.2011	-	0.50%				15'610.56	77.66	610.56

Decomposition of the returns

Portfolio IRR	5.03%
Benchmark IRR	3.05%
Excess IRR	1.98%
Excess TWRR	0.62%
Excess Timing TWRR	1.36%

Benchmark returns

Benchmark Xirr	3.05%
Benchmark cum TWRR	3.66%
Benchmark Timing effect	-0.60%

Contact details and disclaimer

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